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DISCOVERY IN EASTERN WASHINGTON OF A NEW LOBE OF THE PLEISTOCENE CONTINENTAL GLACIER

By Professor WILLIAM H. HOBBS

UNIVERSITY OF MICHIGAN

STUDIES made during the past field season[1] in eastern Washington have disclosed the presence there in Late Pleistocene time of a hitherto unsuspected lobe of the Cordilleran continental glacier. This lobe covered an area of nearly four thousand square miles and is to be known as the Scablands Glacier Lobe. It blocked the Spokane River of that time to impound the waters in Glacial Lake Spokane. This lake included the basins of Lakes Coeur d'Alene and Pend Oreille and extended across Idaho into Montana (see Map I). Its area was thirty-one hundred square miles. When the glacier had evacuated the Scablands, Lake Spokane expanded a distance of one hundred miles down the canyons of the Spokane and Columbia rivers to the site of Coulee Dam as Glacial Lake Leverett.

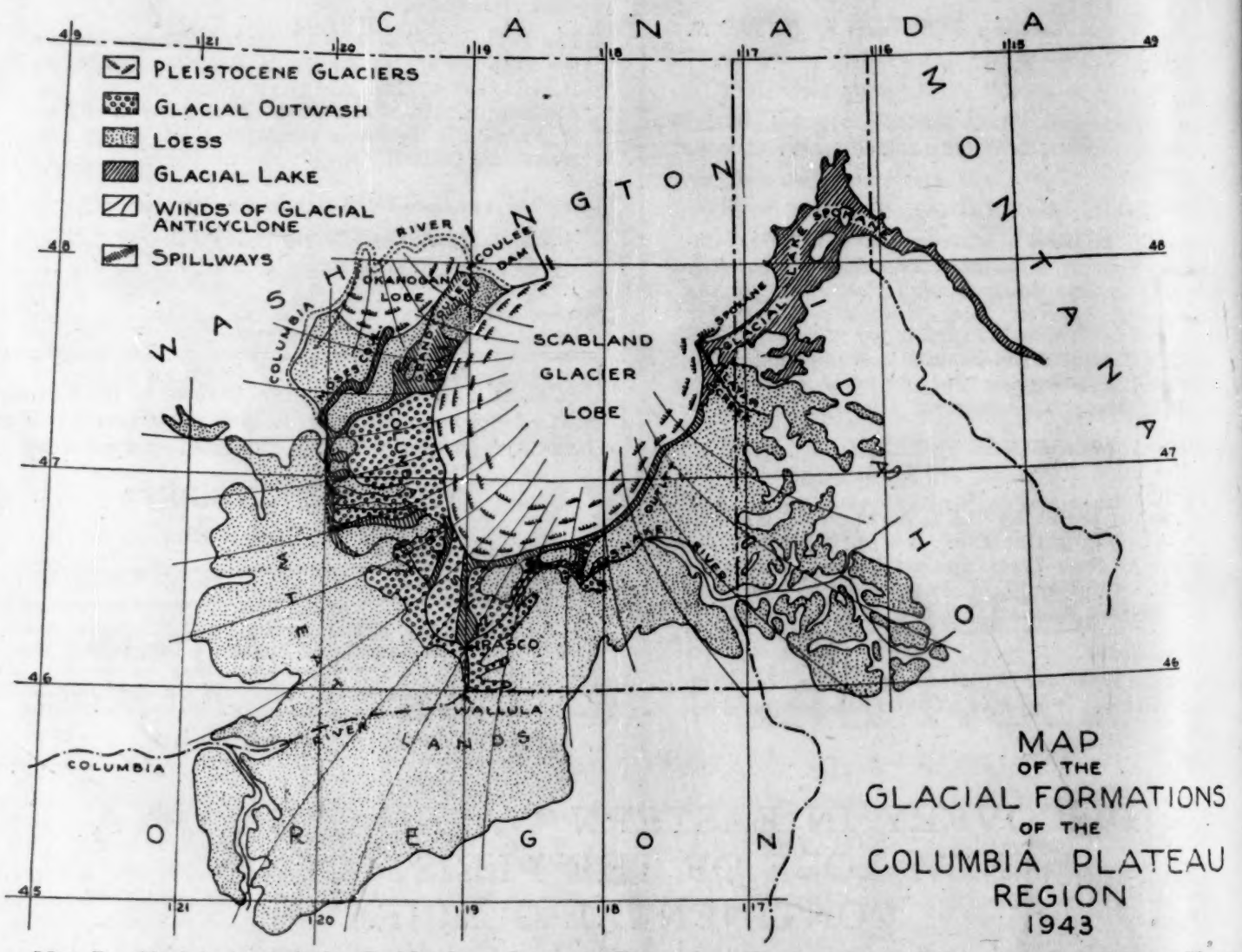
The lava plain which lies to the southwest of Spokane has a surface development almost unique, and has long been known to its inhabitants as the "scablands." To geologists of the late decades it is known as the "channeled scablands" from the apt description by Professor J Harlen Bretz,[2] who has de-

[1] With the aid of grants from the American Philosophical Society and the Geological Society of America. This preliminary notice is printed by permission.

[2] Of Dr. Bretz's many papers treating of the area the

voted years to its study. Many other geologists have made brief references to it, and one of them, Professor Richard Foster Flint,[3] has studied it extensively.

All students of the area seem to have been in agreement on at least one point, that the southernmost border of the Cordilleran glacier was mainly to the north of the Scablands, and near the southern margin of the area of the crystalline rocks. This is near the present courses of the Spokane and Columbia Rivers.



Map I. Glacial map of the Scablands and surrounding area. The boundary of the outwash and the spillways are based on the map by Bretz (*Geog. Rev.*, 18: pl. V), and that of the loess on the map by Marbut ("Atlas of American Agriculture," Pt. III, "Soils of the United States," pls. 4 and 5, sec. 4).

Concerning the origin of the scablands surface there has been little agreement except upon one point, that at some time during the late history torrents of water have played a part. To these torrents Bretz has even ascribed the excavation of the channels with their rock basins and the modeling of the present surface. This surface has a character which is wholly unfamiliar to American geologists from studies made elsewhere, and it certainly bears little resemblance to the accepted features from operation of any of the known geological agents.

In general it may be said that the scablands surface is made up of anastomosing channels within the basalt, channels which are arranged on the plan of braided streams above a plain of outwash. Separating the channels are residual low mesas—black and barren—which are the "scabs." These are bounded by precipitous walls, often terraced, sometimes a hundred feet or more in height.

Scattered on the floors of the channels are hundreds of rock basins, large and small, generally filled with water but sometimes with gravel. Along the sides of the channels are local deposits of gravel, which Bretz has called "bars," and gravel is found also clinging in niches of the walls. This gravel is clearly the residue only of much larger deposits which have been in greater part swept away.

On the larger residual islands between the channels

latest and most comprehensive with an excellent map is "The Channeled Scablands of Eastern Washington," *Geog, Rev.*, 18, 446–447, 1928.

[3] Richard Foster Flint: *Bull. Geol. Soc. Amer.*, 47, 1849–1884, 8 pls., 2 figs., 1936; *ibid.*, 48: 203–232, 5 pls., 1 fig., 1937; *ibid.*, 49: 461–524, 10 pls., 11 figs., 1938.

are heavy deposits of dark brown loess in character identical with that which surrounds the scablands on east, south and west and constitutes the rich wheat lands. These islands are scabs masked by their loess cover.

Against the view of Bretz that the channels and their rock basins have been excavated by torrents of water is the recognized fact that no such features have been produced by running water in any other part of the world. The rock basins of the scablands are found in the wider channels particularly, and rock basins are an almost universal feature of glaciated regions. It is the channels with their included low mesas which are the unique feature of the scablands. If such features seem to be unique, it is almost unique for glaciers to have advanced over lava plains. Nowhere in the world except in Iceland has an ice sheet, either ice cap or continental glacier, been known to have overridden flat lava beds. The lava flows of the Columbia plains reveal within the same bed the widest differences of character. In one place the structure may look like a sponge, it is coarsely vesicular or scoriaceous. Elsewhere it is hard and firm, and the residual mesas have this character. The vesicular lava is especially vulnerable to the glacier's initial attacks by plucking, and after it had been quarried from the rock bed the rock must have been crushed and so made incapable of effective abrasion of the bedrock. The till of the moraines should therefore be poor in clay and characterized by smaller rock nodules, perhaps of pebble size. The vesicular facies of the lava flows are extended in the direction of flow, and if tapped from the preglacial valleys might well yield a channeled rock surface when the glacier had overridden it. Now the area overridden by the Icelandic glaciers supplies a close parallel to the topographic development of the Scablands.[4]

If the scablands of Washington have been glaciated, as have those of Iceland, we should be able to find a marginal moraine outlining its border. This moraine has now been found at many places[5] on the border of the area, where the till is notably poor in the clay constituent and with a preponderance of nodules of pebble size. Less complete data were collected for several recessional moraines, since these have been mutilated by the later torrents of water.

The outwash from the Scablands Glacier Lobe occupies the greater part of the Columbia Basin, which is composed of the Quincy Basin at the north and the Pasco Basin to the southeast (see Map I). During the retreat of this lobe, outwash filled also the channels of that part of the scabland already vacated.

Studies made of the glacial anticyclone of the continental glacier of Greenland have shown that wherever glacial outwash has been laid down, loess must inevitably be deposited within the periglacial area extramarginal to the outwash, and in deposits which thin out gradually from it.[6] Such evidence must always be sought, and as proof of the former presence of a glacier it is not less important than the proven existence of a marginal moraine.

Surrounding the Columbia Basin of outwash on west, south and east is a heavy deposit of loess which thins outward gradually until it disappears (see Map I). The higher mesas of the scablands also, which became nunataks during the retreat of the glacier front, received loess deposits from outwash which was then within the channels still farther back toward the retreating glacier front. Both in the outer and inner deposits wells have revealed thicknesses of loess of much more than one hundred feet.

During the glacier retreat vegetation encroached upon the main outwash area, and this permitted a thin veneer of loess, though everywhere in excess of five feet, to be laid down over the outwash plain. It is this rich deposit which veneers also the older loess that has made possible the Columbia Basin Irrigation Project.

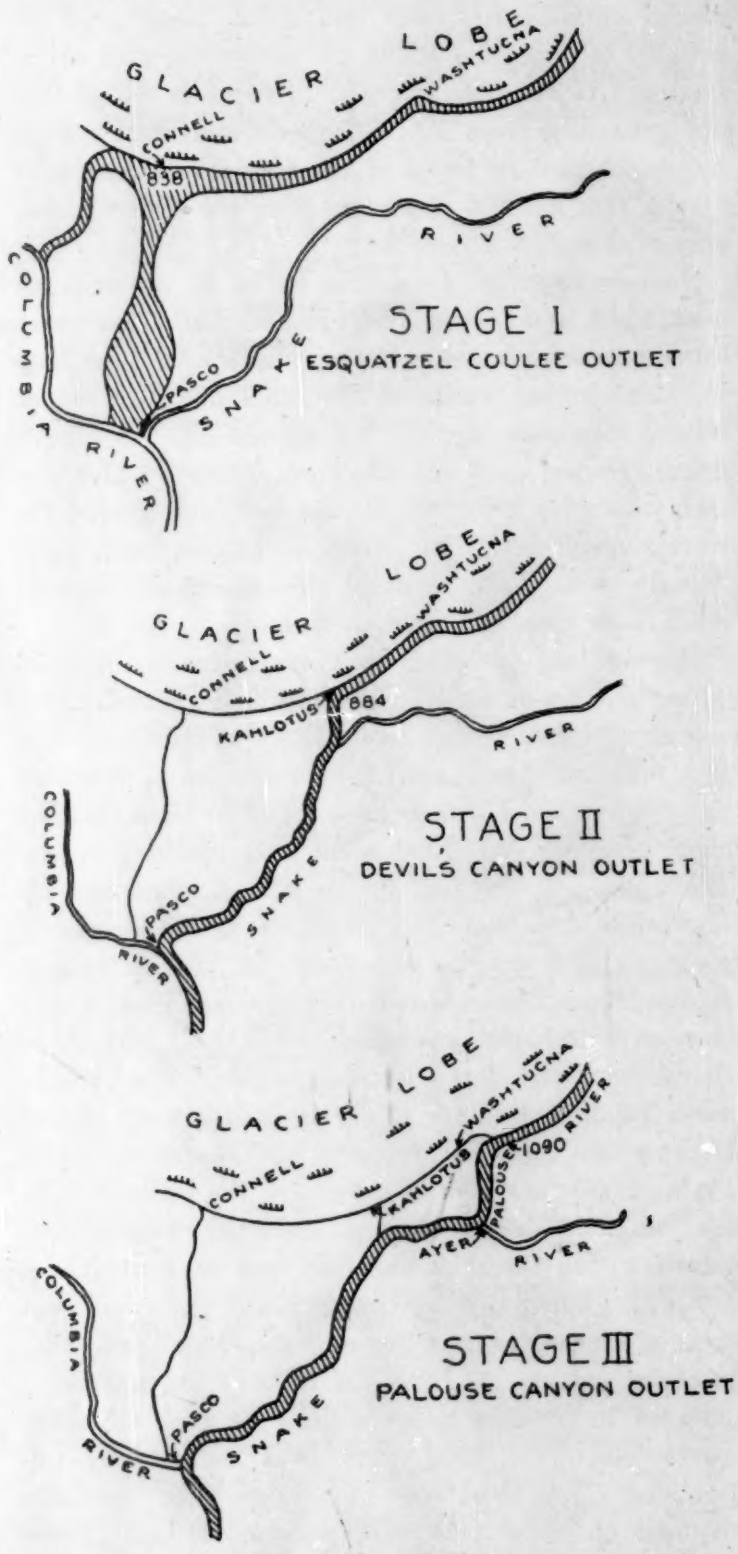
The manner in which by the normal planetary air circulation the glacial anticyclone is progressively overcome and the dissolution of the glacier at last accomplished, has indicated that for each glacial ring between recessional moraines there is a final stage characterized by floods of thaw water. The already much thinned dead ice under its network of glacial streams and lakes is separated into ice-rafts, which by the floods are floated out above the outwash. In the scablands these floods must have been largely contained within the rock channels and in consequence attained torrential velocities sufficient to sweep out most of the outwash, leaving only the "bars" and other localized gravel. At times the rafts of ice must have jammed to produce dams within the rock channels, above which the flood water was temporarily impounded. The level was thus raised and the loess deposits on either side were undermined and cliffed, sometimes at more than one level. The escape channels on the two sides of the jams must have sometimes been occupied by streams at different levels and loess cliffs would fail to pair, a fact which Flint has stressed as characteristic of the scablands. Other floods which

[4] Gudmundur Kjartansson, *Med. fra Dansk Geol. Foren.*, 9: 426–458, Copenhagen, 1939.

[5] Under wartime inhibitions within a specially restricted area, which prevented the use of a motor car, it has not been possible to visit the border throughout, but at every point visited (some twenty-five in all and well distributed) the moraine was found.

[6] *Jour. Geol.*, 39: 381–385, 1931; 50: 556–559, 1942. *Proc. Amer. Phil. Soc.*, 86: 368–402, 1943. *Am. Jour. Sci.*, 241: 333–336, 1943.

coursed through the rock channels of the scablands were connected with later outlets from Lake Spokane, after they had been unblocked through retirement of the ice front.



Map II. Successive outlets of glacial Lake Spokane.

In its stage of maximum development the Scabland Lobe blocked a glacial ancestor of the present Spokane River and impounded the waters in Glacial Lake Spokane over an area of thirty-one hundred square miles. The outlet in this stage was a spillway along the eastern and southern borders of the lobe to near Connell, and thence over the outwash to the Columbia River near its confluence with the Snake.

The outlet's right bank was the glacier and it had a rock sill at 2508′ A.T., four miles northwest of Waverly and twenty-two miles south southeast of Spokane. The water level of the lake was at 2520′ A.T., the level of the highest delta of glacial Latah Creek which discharged into it south of that city.

An advance of the southern front of the lobe closed the initial outlet of Lake Spokane near Connell with its sill at 838′ A.T., and this forced the water to escape into the Snake River by an outlet near Kahlotus, where the sill was at 884′ A.T. (see Map II, parts I and II). This outlet cut the Devil's Canyon. A slight further advance of the ice front closed in its turn the Kahlotus outlet and opened one some thirty miles farther east below Hooper (see Map II, part III), where the sill is near 1246′ A.T. This outlet cut the Palouse Canyon of grandiose proportions so impressively displayed to travelers proceeding southward by railway along its rim.

Six later stages of Lake Spokane were due to as many halting retreats of the glacier front. The outlets were in succession throughout at Cheney with the three spillways already mentioned, which functioned in reverse order, then Koontz Coulee, Lower Crab Creek and, finally, Upper and Lower Crab Creek.

Upon the complete evacuation of the Scablands with the glacier front now north of the Spokane and Columbia rivers, Lake Spokane expanded down the valleys of these rivers to the site of the Coulee Dam. This lake, which I have named Lake Leverett, in a transitional stage had outlets at Cheney (sill at 2345′) and through the Grand Coulee (sill near Steamboat Rock at around 2300′). It was dammed by the first recessional front of the Okanogan Glacier Lobe some fifteen miles west of Coulee Dam. A later stage, dammed near Bridgeport by the third recessional front, extended another fifty miles down the Columbia valley with a bay which covered most of the Waterville Plateau. The Cheney outlet had now been abandoned with a new one opened through the Moses Coulee. Both these outlets operated simultaneously and contained cataracts, that in the Grand Coulee with a fall of over 800 feet, or more than five times as high as Niagara and easily the greatest feature of the kind that is known.

With an original water level of 2366′ A.T. Lake Leverett had later stages of 2345′, 2057′ and 1957′ and 1885′, all registered in gravel plains under the city of Spokane and in somewhat lower sill levels within the Grand Coulee.

BRANCHES OF THE ACADEMY OF SCIENCES OF THE USSR. II

By Dr. P. KOLESNIKOV

VICE-CHAIRMAN OF THE COMMITTEE OF BRANCHES AND BASES OF THE ACADEMY OF SCIENCES OF THE USSR

SEVERAL institutes and branches of the Academy of Sciences widely avail themselves of the agricultural methods evolved by Academician Lysenko.

On the basis of Lysenko's methods, for instance, the collaborators of the Armenian Branch have attained a sharp increase in the crop of beets, a branch of agriculture practically new to Armenia. In 1938 the area of sugar-beet cultivation here was about 2,500 acres, whereas to-day it has been doubled. The experiments conducted by Manaseryan, a collaborator of the Armenian Branch, have shown the full feasibility of planting beets in the lowland areas after the harvesting of the cereal crop. This method of post-harvest planting of beets has been introduced in a number of districts, and some of the collective farms reap a crop of up to 24 tons per acre.

Another worker of this Branch—Ter Saakyan, has obtained a second crop of potatoes (after summer planting), the yield reaching as high as 11.2 tons per acre.

In addition to this the Armenian Branch has accomplished valuable research on topping cotton plants, on raising high-crop yield rust-immune wheat and also drought-resistant fodder cultures.

Interesting work conducted by collaborators of this branch include that establishing the beneficial influence wielded by intra-sort crossing of winter wheat in regard to its frost-resistance, the formation of ears, the absolute weight of grains and other commercial features. By decision of government organs of the Armenian Republic, the collective farms, under supervision of the Biological Institute of the Armenian Branch, are working on intra-sort crossing of winter wheat and on multiplying the resultant seeds with the aim of universally introducing sowing with such intra-sort cross seeds within the next few years.

One of the collaborators of the Armenian Branch has raised a new sort of winter wheat yielding a maintained harvest and resistant to yellow- and stalk-rust.

Based on these same methods worked out by Lysenko, the collaborators of the Kazakh Branch have bred an interesting hybrid sheep, yielding a fine-fleece wool.

As is common knowledge, not a single breed of fine-fleece sheep is adapted for existence at high altitudes above sea level. As a result of crossing merino sheep with the wild Arkhar Mountain ram, 600 head of second, third and fourth generation offspring have already been obtained. This new breed of sheep has a considerably better wool yield than the local breed, the average shearing yield per two-year hybrid sheep equaling 3 kilograms and from the hybrid ram 4½ kg as compared with 1–2 kg obtained from the local breed.

Under the charge of Academician Pavlovsky, the Tajik Branch has done interesting work on the prophylaxis of recurrent typhus caused by ticks. The tasks set by Pavlovsky—to ascertain the distribution of the tick vector of recurrent typhus, to study the ecology of the carrier of this disease and to work out a system of prophylactic measures suited to the conditions of Tajikistan—have been successfully accomplished. Research investigations (Khorezm and West Pamir) found that the causal agent of this disease—the spirochaeta—is carried by ticks, from which it is transmitted to humans. The department of parasitology of the Tajik Branch has worked out methods for prophylactical measures against recurrent typhus, which, in 1940, were tested in practice, with positive results.

Botanical gardens, experimental plots, natural preserves and research stations of the Academy of Sciences branches are to be found in the sub-tropical regions, in the area beyond the Arctic Circle, in the Far East, etc. Intensive work on remaking nature is proceeding in all latitudes.

Vast and thick growths of wild fruit trees and shrubs are to be found on the territory of the Tajik Republic, and the scientists resolved to transform these dense jungle growths into cultivated orchards. Sweet almond, peach and plum were grafted to the wild, bitter almond. By similar means, a local variety of medlar, yielding no fruits, was made to serve as a parent stock for raising quince and pear fruit.

The first crop of peaches raised on the site of former wild growths was obtained last year on the experimental plots of the Tajik Branch.

The Pamir Biological Station of the Tajik Branch of the academy—the only station of its sort in the world—conducts very interesting work. This station has proved that barley can be cultivated at an altitude of 11,500–12,500 feet above sea level. In 1940 this crop yielded from 10.4 to 19.2 cwts per acre here and up to 2–6 tons of straw per acre, the latter, thanks to its high sugar content and soft fibers, forming a particularly good fodder.

Truly bumper crops of radish—8 to 10 tons per acre—are obtained in East Pamir, as well as fine turnip crops of 16 tons per acre.

The problem of introducing the cultivation of potatoes and vegetables in West Pamir, at altitudes ranging from 6,500 to 10,000 feet, has now been solved. Agriculture existed here formerly too, but on a very small scale. Some of the potato growers here have obtained a harvest reaching 40 tons of centifolia potatoes per acre.

The academy branches play an important role in mustering and linking up scientific forces on the spot.

Nearly all the branches and bases convene scientific conferences, sessions and gatherings. The Urals Branch, for instance, convened a special session which met at the Chelyabinsk Tractor Works. Jointly with the workers of this engineering plant, the session outlined interesting problems in the sphere of heat treatment of metal and methods of mechanical casting.

In Tbilisi the Georgian Branch held a conference on mathematics, dealing with the theory of elasticity. The Kola Peninsula Base convened five conferences—in Kirov, Moscow and Monchegorsk—dealing with several important problems of this region.

The Georgian Branch likewise conducts work in the sphere of astronomy. The first mountain astrophysical observatory in the USSR is now under the auspices of the Georgian Academy of Sciences. This observatory, situated not far from the Abastumani health resort, stands on a mountain 5,500 feet above sea level, where the atmosphere is particularly clear. This observatory, which nestles amid greenery, is equipped with a 16-inch refractor and camera for observing and photographing the stars and minor planets, a spectrohelioscope for studying the solar surface, an aberration telescope for observing remote nebulae, etc.

Last year the scientific workers of the Abastumani observatory discovered three new minor planets.

Information concerning the results of Abastumani astronomical observations are published in the USSR and abroad. This observatory also publishes a special bulletin of its transactions.

The republican branches and bases of the Academy of Sciences of the USSR also conduct considerable research in the history of culture, lettering and arts of the peoples of the Soviet Union.

The academy branches have amassed interesting data on material culture. Excavations conducted under the supervision of the late Academician I. Djavakhishvili unearthed at Mtseti-Santavro (Georgia) 400 burials of various types, relating from the twelfth century before our era to the sixth century of the present era. A necropolis of high dignitaries and Iberian kings, relating to the second and third centuries of the present era, has been unearthed in Armavir. Exceedingly valuable historical material has been collected—decorations of gold, silver and precious stones, domestic objects, weapons and articles of cult.

I. Khoshtaria, a scientific collaborator, has unearthed and investigated a Neolithic dwelling in the village of Urta, where polished and hewn implements were found, as well as the most ancient pottery known so far in Georgia.

Equally deserving of mention are the archeological investigations on the site of the ancient city of Ganja, where considerable numbers of artefacts have been unearthed, relating to the pre-feudal and feudal life of ancient Azerbaijan.

Excavations at the ancient Armenian town of Dvina have furnished archeologists with interesting objects referring to the culture and production of Armenia in ancient times. During the centuries-long existence of the Armenian nation a vast amount of material has been amassed characterizing the development of science and the production in various periods of time. This collection, in particular, numbers about 23,000 documents. The collaborators of the Armenian Branch have commenced the systematization and publication of this priceless cultural heritage of the talented Armenian nation.

Under the direction of Professor Ter-Avetisyan, one of the collaborators of this branch, Kafedaryan, is conducting excavations in the ancient state of Urartu. Palaces, granaries, capital walls, shields, arrows, seals, utensils and other valuable objects have been so far unearthed, all this substantially extending our knowledge of the Urartu kingdom and its times.

The Armenian Branch recently convened a special session dedicated to the millennial of the great folk epic "David of Sasun."

In connection with the preparations being made to celebrate the eight hundredth anniversary of the birth of Nizami Ganjawi, the Azerbaijan Branch is putting out a number of interesting publications of works and essays about Nizami and his days.

Another important sphere of work conducted by the academy branches is that relating to language and literature. Corresponding member of the Academy of Sciences of the USSR Shanidze—a collaborator in the Georgian Academy of Sciences—has prepared for publication "An Okshuk Ms. of 978" and a "Papyrus-Parchment Mineus of the Ninth Century," both of which represent ancient monuments of the Georgian language.

Several collaborators have compiled a dictionary of the Georgian language, embracing about 14,000 words.

This branch has accomplished a major undertaking in drawing up a new alphabet. A group of philolo-

gists of the Azerbaijan Branch has completed the compilation of the new Azerbaijan alphabet, based on the Russian lettering, and has reworked the orthographical dictionary.

Besides this the workers in this branch have compiled an Azerbaijano-Russian and Russo-Azerbaijan dictionary, more than 120 printer's signatures in size.

Major work is likewise being done on preparing a catalogue of ancient Armenian MSS—a rare collection of literary monuments of Armenia and neighboring countries.

Considerable work has also been accomplished in putting out text-books in the languages of different nationalities—university and secondary-school textbooks having been published on the history of the peoples of Georgia, Azerbaijan and Armenia.

A five-volume "History of the Armenian People" is at present being prepared under the supervision of Academician A. Manandyan.

The importance of the work accomplished by the branches and bases of the Academy of Sciences of the USSR in 1940 was highly appreciated by the governments of the USSR and of the Union republics, 38 scientific workers of the academy branches having been awarded orders and medals and the title of Merited Scientist being conferred upon some of them, while others were awarded certificates of honor.

The growth and progress of national cadres in the scientific research institutions of the academy branches speaks of the flourishing of science in the national republics of the Soviet Union and of the rapid development of the productive forces in these former backward regions.

OBITUARY

KARL LANDSTEINER

DR. KARL LANDSTEINER, member of the Rockefeller Institute for Medical Research, died on June 26, 1943, after a very brief illness which came upon him in his laboratory at the height of his activity, depriving the world of a great immunologist and, in the broader sense, of a truly great scientist.

Born in Vienna in 1868, Landsteiner grew up in the period of rapid development of the biological sciences. A doctor of medicine at 23, he sensed the importance of organic chemistry and studied with Emil Fischer before turning to research in bacteriology and pathology. Just at this time these fields of investigation were seething with excitement over the successes of antitoxins, the applications of bacterial agglutination and the complexities of hemolysis.

Within ten years, Landsteiner had announced the subtle but incalculably important differences in human bloods, the knowledge of which has saved countless lives, and for which he received the Nobel Prize in Medicine in 1930. He was also the first to transmit poliomyelitis to monkeys, a procedure which made experimental study of the disease possible. Early investigations with Donath on cold agglutinins resulted in the development of a most valuable and frequently used diagnostic test. Still studying blood relationships in 1940, Landsteiner, with Wiener, discovered the so-called *rhesus* factor in blood cells, the great practical importance of which is rapidly becoming evident largely from the work of Levine.

During all Landsteiner's activity in Europe and in the United States he kept pace not only with medicine and the biological sciences, but with the intricacies of rapidly expanding chemical and physical thought as well. Shortly after coming to this country in 1922 he proposed a study of the solubility of pure crystalline oxyhemoglobin of one species in a saturated solution of that of another species as a means of establishing the identity or chemical difference of the two proteins. The idea and its successful execution were the natural outgrowth of his comprehension of a section of Planck's treatise on the "Quantum Theory," which he was reading at that time. This method of studying protein solubilities was later modified and developed by Northrop and his school into one of the most rigid criteria of the purity of proteins.

Landsteiner early in his career realized, as had Ehrlich, the essentially chemical basis of immunity and the chemical nature of the serological reactions by which immune processes are made evident. Years ahead of his time, before the advent of micro-methods and micro-balances, he weighed specific precipitates in the presence and absence of complement, but the equipment available was not sensitive enough to show the significant differences that actually occur.

Aware of the complex structure of the natural protein antigens and the difficulty of tracing the chemical groupings responsible for the serological reactivity and specificity of these substances, although he had made contributions in this direction as well, Landsteiner turned to the effect on specificity of the introduction of known chemical elements and organic groupings, building upon an earlier study by Obermayer and Pick. Using principally the diazo reaction for coupling aromatic amines with proteins to form azo compounds, Landsteiner and his collaborators demonstrated the creation of a new specificity characteristic of the entering group, or hapten, showed the importance of position-isomerism in the entering aromatic groups, and charted the interrelationships of

similarly and differently spaced groupings of all kinds. The discovery that simple substances, chemically related to the hapten, inhibited the specific precipitation of the new antigen and its antibody in proportion to the nearness of relationship to the entering group greatly facilitated the testing of large numbers of substances and made unnecessary the often difficult process of preparing an antigen with each. With this material, he was able to discuss and describe immunological specificity in terms of known chemical groupings of simple structure. Perhaps the most spectacular outcome of this work, and a closer point of contact with the specificity of native proteins, was the demonstration with van der Scheer that the order of amino acids in di-, tri- and tetra-peptides was a major directive influence on the specificity.

Landsteiner's book, "The Specificity of Serological Reactions," not only summarizes these researches but places them in their proper perspective in a broad field in masterly fashion.

Of prime importance, also, has been the long series of investigations carried out by Landsteiner and Chase on skin-sensitivity to simple chemical compounds, a study which laid a scientific basis for new concepts of allergy and its mechanisms. Especially noteworthy was the finding that sensitization results most easily from compounds capable of combining with reactive protein groupings and thus presumably forming new antigens foreign to the organism. And no less important were the final joint studies of these collaborators, as yet unpublished and unfinished, on the transfer of acquired sensitivities of this type.

In the laboratory, Landsteiner was the authoritative and energetic director of research; but outside, in his personal contacts, he was diffident, shy and quiet, though his flashes of genial wit were apt to enliven any conversation in which he took part. When he did address a gathering, he was stimulating, inspiring and brief. He played the piano with a sensitive touch and musicianly understanding, but was as reticent in exhibiting these talents as he was in talking of his work.

Dr. Landsteiner's wife and their son, a surgeon, survive him, but he is mourned as well by a host of friends and scientists who not only revered him for his intellect and attainments, but for his genial accessibility and inspiring counsel, as well.

MICHAEL HEIDELBERGER

C. STUART GAGER

AMATEUR and professional horticulturists and botanists have lost a leader and a friend in the death of Dr. Charles Stuart Gager, director of the Brooklyn Botanic Garden, after a short illness, at Waterville, Maine, on August 9.

Dr. Gager was born in Norwich, N. Y., on December 23, 1872, the son of Charles Carroll Gager and Leora Josephine Darke Gager. He received his A.B. degree from Syracuse University in 1895. The New York State Normal College at Albany conferred degrees of bachelor and master of pedagogy on him in 1897, and he received the Ph.D. degree in botany from Cornell University in 1902. Syracuse University gave him the D.Sc. in 1920, and the New York State Normal College a doctor of pedagogy in 1921. In 1902 he married Bertha Woodward Bagg, and two children, Benjamin Stuart (deceased) and Ruth Prudence (Mrs. Kenneth G. Bucklin) were born.

Beginning as a laboratory assistant at Syracuse University in 1894–95 he became vice-principal of the Ives Seminary at Antwerp, N. Y., in 1895–96; professor of biological sciences and physiography at the New York State Normal College, 1897–1905; director of laboratories at the New York Botanical Garden, 1906–08; and professor of botany at the University of Missouri, 1908–10. In addition he taught for short periods at the Morris High School in New York City, at Cornell University, Rutgers University and New York University. In 1910 he was called to become director of the Brooklyn Botanic Garden, to the development of which he devoted the balance of his life. Starting with an area of waste land he created one of the outstanding institutions of its kind.

His botanical interests were primarily physiological and, while associated with the New York Botanical Garden, he initiated one of the earliest investigations of the effect of radium upon plants. Administrative duties and other demands prevented him from developing what might easily have become a brilliant career in research.

Always generous with his energy and his time he served on many committees and boards of horticultural and botanical organizations. His addresses, freely given on numerous occasions, were carefully prepared and always spiced with humor and some unusual or unique point of view. In spite of his numerous other duties and activities, he found time to publish several books on teaching, botany and genetics, and to act as editor or business manager of important botanical periodicals, including the *American Journal of Botany, Ecology* and *Genetics*.

Among other societies Dr. Gager was a member of Phi Beta Kappa and of Sigma Xi and an honorary member of the Royal Agricultural and Horticultural Society of India, of the Pennsylvania Horticultural Society and of the School Garden Association. He served as president of the Botanical Society of America; of the Torrey Botanical Club, of the National Institute of Social Sciences and of the Twentieth

Century Club of Brooklyn. An active member of the International Flower Show Committee, he served also on several committees of the National Research Council. He was vice-chairman of the board of directors of the Horticultural Society of New York for many years, and for eight years a trustee of Adelphi College. He was a director of the Bermuda Biological Station for Research and of the New Jersey Federation of Shade Tree Commissions. In 1941 he received the Arthur Hoyt Scott Garden and Horticultural Award.

Few men have been able to combine, as Dr. Gager did, horticulture and botany, education and research, the applied and the scientific, civic interests and professional duties. A man of the highest ideals, Dr. Gager did not hesitate to oppose attitudes, ideas or trends which he considered unwise or ill considered or to correct erors in fact or statement in the fields with which he was familiar. Yet no worthy project related to his fields of interest failed to receive quick and generous support. His career illustrates how much can be done by a man of ability who devotes himself consistently and conscientiously to a subject he considers worthy of his utmost effort.

WILLIAM J. ROBBINS

DEATHS AND MEMORIALS

DR. ALEŠ HRDLIČKA, since 1910 curator of the Division of Physical Anthropology of the U. S. National Museum of the Smithsonian Institution, of which he had been in charge since 1903, died on September 5 at the age of seventy-four years.

DR. H. JUSTIN RODDY, formerly curator and professor of geology at Franklin and Marshall College, died on September 4 at the age of eighty-seven years. Dr. Roddy joined the faculty of Franklin and Marshall College in 1922. He had previously been a member of the faculty of the Millersville State Teachers College.

DR. ARTHUR PEHR ROBERT WADLUND, professor of physics at Trinity College, Connecticut, died on September 1 at the age of forty-seven years.

DR. THOMAS GILBERT PEARSON, president emeritus of the National Association of Audubon Societies, died on September 3 at the age of sixty-nine years. He resigned from the presidency of the association in 1934, after serving for fourteen years. He had previously been secretary and executive officer of the society.

JOHN K. GORE, mathematician, until 1934 president of the Prudential Insurance Company, died on June 22, at the age of seventy-nine years.

THE death is announced of Dr. Willem A. J. M. Van Waterschoot van der Gracht, formerly inspector general of state mines in the Netherlands, who had been connected with ore and petroleum companies in the United States and Canada.

THE life and work of Alexander Wilson, author of the first American ornithology, will be the subject of the October number of *Frontiers*, the magazine of the Academy of Natural Sciences of Philadelphia. On the evening of October 20, Dr. Cornelius Weygandt will address members of the academy and guests on the place of Wilson in American life, science and art. On account of limited editions imposed by the war, those wishing to have the special Wilson number of *Frontiers*, which will appear on September 15, should apply at once.

SCIENTIFIC EVENTS

SCIENTIFIC RESEARCH IN GREAT BRITAIN

IN the British House of Lords on July 20 there was a continuation of the debate on a motion by Viscount Samuel calling attention to the need for the further expansion of scientific research. Lord Dawson pointed out that "It was difficult to overstress the importance where science was concerned—and this applied equally to medicine—of preventing the enmeshment of any research body in the close entanglement of a Government department. One of the chief reasons why these research bodies should receive further support was that they succeeded in combining good order in the work of men of ability with freedom for scientific investigation."

Lord Cherwell said in part "that the importance, from the economic point of view, of fostering pure fundamental research could not be overlooked. The Government recognized that pure research must be, in a large measure, its responsibility and must be done at the universities; but naturally, they also wished to encourage industry to spend money on pure research. It was the Government's policy and intention to increase its aid for research, and it would welcome any developments of industry in a similar direction. The treatment of scientists in the Civil Service had been mentioned, and he frankly admitted that the Civil Service had not hitherto shown due regard for the contribution scientists were making to the nation's welfare. This matter had now been reviewed, and an investigation had been in progress to make sure that the conditions of service, pay and prospects of Government scientific employees compared favorably with those on the administrative side. He hoped that a definite announcement on these reforms might be made before long. There were probably not more than a few dozen physicists in Great Britain capable of evolving and developing new applications of, say, the various radio

devices on which success in this war very largely depended. Every one would agree that it was an anomaly to pay them on lower scales than men of equal educational status who, because they had distinguished themselves in what were usually called "humane" subjects, were often given war jobs of much higher status and pay than the scientist.

THE CANADIAN AIRCRAFT STANDARDS TECHNICAL COMMITTEE

IT is reported in *Industrial Standardization* that an Aircraft Standards Technical Committee has been organized by the Canadian Engineering Standards Association to set up standards and simplified practices for materials and component parts used in the construction of aircraft in Canada and to coordinate these standards with the standards used in the United States, Great Britain and Australia. Three meetings of the committee have been held.

Cooperative arrangements have been made by the committee with the British Air Commission, the U. S. Aeronautical Board, the U. S. Aeronautical Chamber of Commerce, the U. S. Army and Navy Air Corps, the National Aircraft Standards Committee, the Society of Automotive Engineers and other organizations working on aircraft standards in the United States. The functions of each of the important organizations in the aircraft standards field were discussed in detail at the August meeting in order that all representatives present at the meeting might have a clear picture of the general program.

The work of the Aircraft Standards Technical Committee is to include adoption of standards, the issuing of bulletins on conservation, the collection of bulletins and information from standardization organizations in other countries, and the exchange of information with such organizations. Examples of conservation and of standardization have been prepared.

The committee, which will function as a subcommittee of the Canadian Engineering Standards Association, is made up of representatives of the nine Canadian aircraft contractors, the Royal Canadian Air Force and the Department of Munitions and Supply, Aircraft Production Branch. In addition to the Air Force and the Munitions Department, those represented at the first meetings of the committee included Boeing Aircraft of Canada, Ltd.; Canadian Car and Foundry Company, Ltd.; Canadian Vickers, Ltd.; DeHavilland Aircraft, Ltd.; Fairchild Aircraft Ltd.; Federal Aircraft Ltd.; Fleet Aircraft, Ltd.; Noordwyn Aviation, Ltd., and Victory Aircraft, Ltd.

THE LEWIS CASS LEDYARD, JR., FELLOWSHIP OF THE SOCIETY OF THE NEW YORK HOSPITAL

THE Lewis Cass Ledyard, Jr., fellowship was established in 1939 by a gift from Mrs. Ruth E. Ledyard, in memory of her late husband, Lewis Cass Ledyard, Jr., a governor of the New York Hospital. The income, amounting to approximately $4,000 annually, is awarded to an investigator in the fields of medicine and surgery or in any closely related field. This amount is applied as follows: $3,000 as a stipend and, approximately, $1,000 for supplies or expenses of the research. In making the award, preference is given to younger applicants who are graduates in medicine and who have demonstrated fitness to carry on original research of high order. The recipient of this fellowship will be required to submit reports of his work under the fellowship, either at stated intervals or at the end of the academic year; and when the result of his work is published he will be expected to give proper credit to the Lewis Cass Ledyard, Jr., Fellowship. The research work under this fellowship is to be carried on at the New York Hospital and Cornell University Medical College. The fellowship will be available on July 1 at the beginning of the academic year. Applications for the year 1944–45 should be in the hands of the committee by December 15. It is expected that the award will be made by March 15, 1944.

Application for this fellowship should be addressed to The Committee of the Lewis Cass Ledyard, Jr., Fellowship, The Society of the New York Hospital, 525 East 68th Street, New York, N. Y.

GRANTS FOR RESEARCH IN APPLIED PSYCHOLOGY

THE Psychological Corporation has made the following grants of $250 each for research in applied psychology:

Clark, Ruth Millburn, University of Southern California. A Method of Administering and Evaluating the Thematic Apperception Test in Group Situations.

Grossnickle, Louise T., University of Chicago. A Factorial Analysis of the Merrill-Palmer Preschool Test on Two Age Groups, 31–33 and 49–51 months.

Murray, Elsie, Cornell University. Variation in Hue Sensitivity in Normal and Aberrant Cases: Test Devices.

Nahm, Helen, University of Minnesota. Evaluation of Some of the Outcomes of the Nursing School Curriculum.

Odoroff, Maurice E., University of Minnesota. A Genetic Analysis of Reactions of Delinquent and Non-delinquent Boys to Words Included in Certain Tests of Emotional Development.

Reichard, Suzanne K., Columbia University. The Age Factor in the Development of Specific Mental Abilities.

Roth, Harold F., University of Minnesota. An Analysis of Production Records in a Selected Manual Operation.

Samelson, Babette F., Radcliffe College. The Relationship between Race Prejudice and Insecurity.

Sargent, Helen D., Northwestern University. An Application of Projective Principles to a Paper and Pencil Personality Test.

Members of the Grants-in-Aid Committee are Harry D. Kitson, A. T. Poffenberger, Rose G. Anderson, George K. Bennett, Walter R. Miles, *Chairman,* and Albert D. Freiberg, *Secretary.*

THE "B-COMPLEX" AWARD OF MEAD JOHNSON AND COMPANY

NOMINATIONS are solicited for the 1944 award of $1,000 established by Mead Johnson and Company to promote researches dealing with the B-complex vitamins. The recipient of this award will be chosen by a committee of judges of the American Institute of Nutrition.

The award will be given to the laboratory (non-clinical) or clinical research worker in the United States or Canada who, in the opinion of the judges, has published during the previous calendar year January 1 to December 31 the most meritorious scientific report dealing with the field of the "B-complex" vitamins. While the award will be given primarily for publication of specific papers, the judges are given considerable latitude in the exercise of their function. If in their judgment circumstances and justice so dictate, it may be recommended that the prize be divided between two or more persons. It may also be recommended that the award be made to a worker for valuable contributions over an extended period, but not necessarily representative of a given year. Membership in the American Institute of Nutrition is not a requisite of eligibility for the award.

To be considered by the committee, nominations for this award for work published in 1943 must be in the hands of the secretary by January 10, 1944. The nominations should be accompanied by such data relative to the nominee and his research as will facilitate the task of the committee in its consideration of the nomination.

ARTHUR H. SMITH,
Secretary

AMERICAN INSTITUTE OF NUTRITION

THE NUTRITION FOUNDATION

ACCORDING to a statement made by George A. Sloan, president of the Nutrition Foundation, the sum of $237,000 is now being contributed annually by 37 food and related manufacturers to the foundation in support of basic research in the science of nutrition.

It was also announced that Abbott's Dairies of Philadelphia and the American Lecithin Company of New York have become sustaining members of the foundation. C. R. Lindback, president of Abbott's Dairies, and Adrian D. Joyce, chairman of the American Lecithin Company, have become members of the board of trustees, which consists of 11 representatives from the public and 33 from industry.

Mr. Sloan stated that the Nutrition Foundation is now supporting 70 basic studies in 38 institutions in the United States and Canada. On the recommendation of the Scientific Advisory Committee of the foundation, grants-in-aid amounting to $302,840 have been paid to these institutions since the organization of the foundation in 1942.

Mr. Sloan states that:

> Research studies having an immediate bearing on the war emergency, in which the foundation is working in close cooperation with governmental authorities, include the effects of cooking, dehydrating, freezing and storing on the nutritive quality of vegetables and meats; the influence of dietary factors in healing of bone fractures; the relation of vitamins to susceptibility to infection; the effects of military environment on nutrition; the value of nutrition in reducing the incidence of shock following injury and exposure and treating individuals suffering from shock; nutrition and resistance to fatigue; and the utilization of the proteins and minerals of the soybean.
>
> Other research studies of the foundation relating to public health include clinical nutritional deficiencies; types and degrees of malnutrition; dental caries; liver function; rheumatic fever; comparative studies of the nutrients in human and cow's milk under specific dietary conditions; increasing the nutritive value of vegetable foods; and studies of protein, amino acids, minerals (calcium and iron) and vitamins.

THE FIFTIETH ANNIVERSARY OF FIELD MUSEUM OF NATURAL HISTORY

FIELD MUSEUM OF NATURAL HISTORY, born with the issuance of its charter by the Secretary of State of Illinois on September 16, 1893, will soon celebrate its fiftieth anniversary.

A special exhibit illustrating some of the main developments in the museum's first fifty years will be opened to the public at 9 A.M. on Thursday, September 16. A preview and reception for the 4,300 members of the museum, the press and invited guests, representing civic, educational, scientific and other circles, will be held at 8:30 on the evening of September 15. President Robert Maynard Hutchins, of the University of Chicago, will be the principal guest speaker. He will be followed by Dr. Albert Eide Barr, director of the American Museum of Natural History, New York, and Dr. Franklin Bliss Snyder, president of Northwestern University. Dr. Osgood, "dean of the staff," will introduce the speakers. Brief addresses will be made also by President Field, Marshall Field, Orr Goodson, acting director, and possibly by the director, Colonel Clifford C. Gregg, if his army post with the Tank Destroyer Center at Camp Hood, Texas, is able to grant him leave to attend.

Concurrent with the golden anniversary exhibit will be the opening of the museum's first International Photographic Exhibit under the title "Lenses on Nature." This salon of pictures, selected from entries submitted by contributors in all parts of this country and many foreign countries, will continue through

November 15. The pictures will be chosen by a jury of selection composed of Dr. Fay-Cooper Cole, chairman of the department of anthropology of the University of Chicago; Valentino Sarra, professional photographer of New York and Chicago; C. R. Brockhausen, past president of the Chicago Camera Club; J. P. Wahlman, president of the Fort Dearborn Camera Club; Samuel Insull, Jr., museum trustee; and Dr. B. E. Dahlgren, chief curator of botany. Ribbons will be awarded to photographs considered as possessing special merit.

Beginning on September 16, and continuing as long as a limited supply lasts, the first few thousand adult visitors coming to the museum for the fiftieth anniversary will receive copies of "Fifty Years of Progress," a special illustrated 40-page issue of *Field Museum News*, the monthly periodical published for members of the museum. This issue is devoted entirely to a summary of the history of the museum to date and to a forecast of its future. Contributors include Stanley Field, president of the museum since 1909; Orr Goodson, acting director; Dr. Paul S. Martin, chief curator of anthropology; Dr. B. E. Dahlgren, chief curator of botany; Henry W. Nichols, chief curator of geology; Karl P. Schmidt, chief curator of zoology; John R. Millar, curator of the N. W. Harris Public School Extension; Miriam Wood, chief of the James Nelson and Anna Louise Raymond Foundation lecture staff; Mrs. Emily M. Wilcoxson, librarian; Henry F. Ditzel, registrar; Dr. Wilfred H. Osgood, curator emeritus of zoology, and Dr. Wilfrid D. Hambly, curator of African ethnology. The book was produced under the managing editorship of H. B. Harte, public relations counsel.

SCIENTIFIC NOTES AND NEWS

DR. WALTER B. CANNON, professor emeritus of physiology at the Harvard Medical School, president of the recently formed American-Soviet Medical Society, organized to stimulate the exchange of medical information between the United States and the Soviet Union, was formally inducted at a reception given in his honor by the Soviet Embassy on August 12 as a member of the Academy of Sciences of the Union of Soviet Socialist Republics.

THE Chicago Section of the American Institute of Chemists on October 1 will give a testimonial dinner at the Morrison Hotel in Chicago, in honor of Dr. F. C. Koch, formerly chairman of the department of biochemistry of the University of Chicago, at present head of the Biochemical Division of the Research Laboratories of Armour and Company. Addresses will be made by Dr. Edward A. Doisy, of the School of Medicine of St. Louis University; Victor Conquest, director of research of Armour and Company; Dr. George K. K. Link, of the University of Chicago, and Dr. Koch.

THE twenty-fifth anniversary of the appointment of Dr. Gebhard Stegeman as professor of physical chemistry at the University of Pittsburgh was celebrated at a dinner in the Hotel Schenley on September 7, in connection with the convention in Pittsburgh of the American Chemical Society.

DR. ROBERT P. FISCHELIS, of Trenton, N. J., head of the chemicals, drugs and health supplies branch of the War Production Board, and a former dean of the New Jersey College of Pharmacy, has been awarded the Remington Honor Medal, conferred annually by the New York Branch of the American Pharmaceutical Association on "the man or woman who has done most for American pharmacy during the preceding year or during a longer period of outstanding activity and fruitful achievement."

THE Baly Medal of the Royal College of Physicians, London, has been awarded to Dr. F. C. Bartlett, professor of experimental psychology at the University of Cambridge, for his work in the science of physiology and in particular for his contributions to experimental psychology; the Gilbert Blane Medal to Surgeon-Commander D. P. Gurd, and the Murchison scholarship to Dr. Bruce Cruickshank.

DR. FLORENCE RENA SABIN, formerly of the Rockefeller Institute for Medical Research, has been made an honorary national commander of the Women's Field Army of the American Society for the Control of Cancer.

PROFESSOR TREVOR KINCAID is retiring as chairman of the department of zoology and physiology of the University of Washington, Seattle, having held the position since 1901. Dr. Arthur Svihla has been selected as his successor.

DR. DAVID L. SOLTAU, formerly coordinator of the engineering, science and management war-training program at the University of Southern California, has been appointed professor of physics and head of the department at the University of Redlands. He took up his work on June 15.

DR. JOHN N. COOPER, of the department of physics of the University of Southern California, has been appointed assistant professor of physics at the University of Oklahoma.

DR. P. L. KNUDTZEN has been appointed acting dean of the College of Dentistry of Baylor University

Dallas, to succeed the late Frederick W. Hinds, ho died on June 4. Despite the removal of the Col-ge of Medicine of Baylor University to Houston, it expected that the College of Dentistry will continue be conducted at Dallas.

DR. SCHUICHI KUSAKI, who for the last six years s worked successively at the Massachusetts Insti-te of Technology, the University of California and e Institute for Advanced Study at Princeton, has ceived a temporary appointment as instructor in ysics at Smith College.

DR. CHARLES A. DOAN, professor of medicine and rector of medical research at the College of Medicine the Ohio State University, has been elected presi-nt of the Ohio Public Health Association.

DR. IVAN G. HOWE, Allegany County welfare com-issioner, has been appointed director of the Bureau Animal Industry of the New York State Depart-nt of Agriculture. He succeeds Dr. Ernest T. ulder, who has retired.

DR. J. ALLEN SCOTT, associate director of the Divi-n of Malaria and Hookworm Service of the Georgia partment of Public Health, has become senior tistician of the Division of Vital Statistics of the S. Bureau of the Census, Washington, D. C.

DR. DOUGLAS PARRY, clinical psychologist at Syra-se University, has been appointed clinical psycholo-t in the Bureau of Child Guidance at the Southern inois Normal University at Carbondale.

DR. JOHN S. KARLING, associate professor of botany Columbia University, has leave of absence to enable n to undertake work with the Rubber Development rporation at Miami, Fla.

DR. JULIUS BERGER, for the past three years re-rch associate at Connecticut College on a Rocke-ler grant to Professor George S. Avery, Jr., has ned the biochemical staff of the Hoffmann-La Roche emical Company.

DR. GUY M. EVERETT, of the department of physiol-y of the Medical School of the University of Mary-d, has become associated with the department of rmacology of Abbott Laboratories, North Chicago.

BAKELITE CORPORATION, a unit of Union Carbide d Carbon Corporation, has announced the appoint-nt of Dr. Raymond Charles Bacon to the research d development laboratories in Bloomfield, New rsey.

THOMAS S. NICHOLS, consultant of the Chemical vision of the War Production Board, is in London special assignment with the Harriman mission, dling problems connected with the Lend-Lease gram.

LINDON J. MURPHY, associate professor in the Engineering Extension Service at Iowa State College, has been given leave of absence to accept a commission as major with the U. S. Public Health Service. He will work with the sanitary engineers of the service.

DR. C. E. RONNEBERG, chairman of the division of physical sciences of Herzl City College, Chicago, has been granted leave of absence for the duration of the war. He is serving in the grade of major on the faculty of the Chemical Warfare School, Edgewood Arsenal, Md.

PROFESSOR HENRI LAUGIER, professor of general physiology at the Sorbonne, director of science at the University of Montreal, has been appointed by the French Committee of National Liberation chancellor of the Academy of Algiers, and has received jurisdiction over all French education in North Africa. From 1937 to 1940 Dr. Laugier was in charge of the Central National Scientific Institute of Research at the Ministry of the Naval Education in Paris. He was also chief of cabinet to the Minister of Education.

DR. CECIL HENRY DESCH, from 1932 to 1939 superintendent of metallurgy of the British National Physical Laboratory, previously from 1920 to 1931 professor of metallurgy at the University of Sheffield, has become director of the British firm of Richard Thomas and Company. He will advise the company on matters of scientific research.

SIR HENRY TIZARD, president of Magdalen College, Oxford, until recently chairman of the British Aeronautical Research Committee, has resigned from the Air Council and the Aircraft Supply Council of the Ministry of Aircraft Production. He will leave England on a special mission for two or three months.

DR. LIBERTY HYDE BAILEY, of Cornell University; Dr. U. P. Hedrick, formerly director of the New York State Experiment Station at Geneva; Dr. M. B. Davis, Dominion horticulturist of Ottawa; W. S. Blair, of the Nova Scotia Experiment Station at Kentville, and other leaders in the field of horticulture will take part in the twenty-fifth annual meeting of the New York State Fruit Testing Cooperative Association to be held at the Experiment Station at Geneva on September 16. The history of the association will be reviewed by Dr. Hedrick and L. F. Strickland, of Lockport, N. Y., two of its first directors; W. C. Stone, of Springfield, Vt., first secretary-treasurer of the association, and Professor R. D. Anthony, of the Pennsylvania State College, formerly horticulturist at Geneva. Dr. Bailey, Dr. Davis and Mr. Blair will discuss the importance of new varieties to the fruit-growing industry, and the desirable and undesirable characteristics of recent introductions, many of which will be on display. Dr. W. S. White-

house, in charge of plant introduction for the U. S. Department of Agriculture, and Dr. W. W. Aldrich, also of the Federal Department, will outline the government's fruit-breeding program with particular reference to new introductions that offer possibilities in fruit-breeding work.

IT is reported in the *Journal* of the American Dental Association that C. Willard Camalier, chairman of the War Service Committee, has announced that the War Manpower Commission has approved of a new committee on dental education to act as adviser to the directing board of the Procurement and Assignment Service. The appointment of two additional members to represent dental examiners to the Committee on Dentistry of the Procurement and Assignment Service for Physicians, Dentists and Veterinarians was also announced. The committee will concern itself with developments arising out of the Army and Navy Specialized Training Program, as well as with the training of students for civilian practice. Members of the committee are J. Ben Robinson, dean, Baltimore College of Dental Surgery, University of Maryland; Dr. Harlan H. Horner, executive secretary, Council of Dental Education of the American Dental Association; Carl O. Flagstad, secretary, American Association of Dental Schools; Wendell D. Postle, dean, College of Dentistry, the Ohio State University; Bert L. Hooper, dean, College of Dentistry, University of Nebraska.

IT is stated in *Nature* that the British Ministry of Food has, by arrangement with the Department of Scientific and Industrial Research and the flour milling industry, taken over for the period of the war the extensive laboratories at St. Albans which were previously occupied by the Research Association of British Flour Millers. The Ministry will have the advantage of the use of these laboratories and the existing staff for the consideration of all food research problems, but they will continue to be used in the main for specialized work connected with cereals and cereal products. The laboratories will, in future, be known as the Cereals Research Station of the Ministry of Food. Dr. P. Moran, who was previously director of research to the Research Association of British Flour Millers, has been acting as deputy scientific adviser to the Ministry since June, 1940. In March last he was appointed, in addition, director of research in the Ministry of Food. In this latter capacity he will direct the work at St. Albans. From June 1, the date on which the transfer took place, the entire control and direction of the laboratories passed to the Ministry of Food.

DISCUSSION

SCIENTIFIC RESEARCH BY THE DEPARTMENT OF AGRICULTURE

UNDER date of July 26 I called the attention of Dr. Karl T. Compton to the fact that the material in his Pilgrim Trust Lecture, "Organization of American Scientists for the War," appearing on page 73 of SCIENCE, for July 23, 1943, contained certain errors relative to work carried on by the Department of Agriculture. He very kindly replied, in a letter of July 31, 1943, in which he expressed regret that, despite his efforts to clear and attain full accuracy, misstatements were made. He also wrote:

> I wonder if you would feel like submitting to the editor of SCIENCE a brief comment on the subject, in which you would call attention to such errors of statement or implication as may have concerned the Department of Agriculture in my lecture. I should welcome it if you should wish to do so, and it would certainly be worth while to get the record straight promptly.

In the part of his lecture to which I made reference Dr. Compton stated that the scientific research carried on by the Department of Agriculture was quite largely spread through a great number of agricultural experiment stations distributed in the various states, with which it operated cooperatively. He also said: "Most of the bureaus in Washington are primarily of an administrative character, but there are several which also conduct centralized research, as, for example, the Bureau of Chemistry and Soils and the Food and Drug Administration."

The facts are that the department's initial work was in the field of scientific research, the introduction of valuable plant species, entomology, botany, chemistry, meteorology, and so on. Its first bureau, the Bureau of Animal Industry, was created by act of Congress of May 29, 1884, and has carried on and still performs very distinguished research in the field of animal diseases, of the breeding, feeding and management of domestic animals and related subjects.

On March 2, 1887, an act was passed which authorized the establishment, under the direction of the land-grant colleges, of stations in each state to conduct agricultural experimentation. The Office of Experiment Stations was established in the Department of Agriculture, in 1888, to act as a staff agency to administer Federal grants involved in this and subsequent supplementary legislation. This work includes the evaluation and approval of research projects, proposals for new projects, project revisions, annual research programs and budget allotments of the state experiment stations, as well as the coordination of their researches with similar or related investigations

rried on by the department itself. This is the epartment's sole agency with the administrative functons mentioned.

On December 13, 1941, a major reorganization of e Department of Agriculture was announced to reamline it for the war effort. An Executive Order ted February 23, 1942, validated this reorganizaon. At that time seven of the old-line scientific reaus and agencies, concerned largely with research ork, were combined to form the Agricultural Reearch Administration. Included also were the four rge Regional Research Laboratories, authorized in 38, and established at Peoria, Ill., Albany, Calif., hiladelphia, Pa., and New Orleans, La.; the nine ankhead-Jones laboratories for research on special ricultural projects; and the Beltsville (Md.) Reearch Center.

In February, 1943, due to an internal reorganizaon within the Agricultural Research Administration, me of the bureaus were re-named. Their names ill provide a sufficient indication of the fields of search they cover for present purposes and are now follows: Bureau of Animal Industry, Office of xperiment Stations, Bureau of Entomology and lant Quarantine, Bureau of Human Nutrition and ome Economics, Bureau of Dairy Industry, Bureau Plant Industry, Soils, and Agricultural Engineerg, and the Bureau of Agricultural and Industrial hemistry. The work of the Regional Research Laboatories is now closely integrated with the last.

As a result of Presidential reorganization plans annunced in 1939 and 1940, the Weather Bureau was ansferred to the Department of Commerce, the Food d Drug Administration to the Federal Security gency, the Bureau of Public Roads to the Federal orks Agency, and the Bureau of Biological Survey the Department of the Interior, where it became rt of the Fish and Wildlife Service.

In addition to the above-mentioned agencies in the gricultural Research Administration, the department rries on considerable scientific research in the Forst Service and in the Soil Conservation Service. The rmer does research in twelve forest and range exriment stations, and in the well-known Forest Prodts Laboratory at Madison, Wis. The latter conducts vestigations into the character, cause and effect of l erosion and water depletion, and develops methds of soil and water conservation in cooperation with te agricultural experiment stations. Finally, the reau of Agricultural Economics is the central statisal and economic research agency of the department, d has done outstanding work in the fields of social d economic science.

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A TEA PREPARED FROM NEEDLES OF PINE TREES AGAINST SCURVY

IN the issue of SCIENCE for August 6, 1943, Maurice Donnelly calls attention to the work of B. Shishkin concerning the use of needles of ordinary pine trees against scurvy. Francis Parkman is quoted as having published the beneficial effect of a decoction of evergreen on scurvy.

The beneficial effect of this substance was discussed in an article of Dr. Walter Tobler, now in Bern, Switzerland, who studied scurvy in the children's clinic of the University of Vienna after the first World War. His paper is published in the *Zeitschrift fuer Kinderheilkunde* (Vol. 18, pp. 63–158, 1918). He found the publication of Lind, "Treatise about Scurvy," (Riga and Leipzig, 1775, translated from the second edition (English) by Petzold).

In the war between Sweden and Russia (most likely the march of Charles XII into the Ukraina in the winter of 1708/09) almost all soldiers of the Swedish army became incapacitated through scurvy. But the further progress of the disease was stopped, as according to the advice of Erhenius, the royal physician, a tea prepared from pine needles was used. Even the most severe cases were cured and soldiers up to that moment free from scurvy were protected. This remedy became therefore very famous and the pine tree was called afterwards *Pinus Antiscorbuticus*.

Lind quotes further proofs for the beneficial effect of pine needles and needles of other conifers. Later the cones and even the green bark of these trees were used against scurvy and not only in form of tea but also in form of pine-beer. Lind states with enthusiasm: "If one takes a few bags filled with Pine branches on an ocean trip, one may prepare this 'marvellous drink' at any time. The drink may be prepared by letting the pine needles ferment in wine or beer."

One of the first antiscorbutic remedies in Europe was wine in which Vermouth was put in and boiled. But Lind states that experience teaches that "real" pine-needle beer better than anything else not only prevents scurvy but it is also a very effective curative remedy.

Tobler points out that the richness of woods in pine trees in Europe gives the people the consolation that they possess an excellent remedy against scurvy. Wine and beer are not necessary.

Tobler prepared the drink by pouring boiling water over the crushed needles, letting the extracting proceed until the tea obtained an exquisite aroma of pine needles. The taste of the tea is very pleasant so that even a sensitive palate will not refuse it. Tobler used the tea and was enthusiastic about it. I took it myself and found the drink very nice.

Children went with knapsacks into the pine woods

in order to collect the pine needles, and each child received one cup of pine-needle tea daily.

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VITAMIN C IN EVERGREEN-TREE NEEDLES[1]

THE identity of the tree that cured Jacques Cartier's men of scurvy when they wintered near Quebec in 1535–6 will always remain in doubt, as the Iroquois name "annedda" (ameda) denotes simply an evergreen tree. Many of Champlain's men died of scurvy when he wintered near the same place 73 years later, in 1608–9. Champlain had heard something of Cartier's miraculous "annedda," but he sought it in vain, probably because he did not know it was a tree—he speaks of it as "l'herbe appelée Aneda"—and because since Cartier's time the Iroquois population had moved away and the Algonquins who had replaced them could not tell him the meaning of the word.

Almost every editor of the Voyages of the early French explorers, beginning with Hakluyt in 1600, has proposed a different tree for annedda. The suggestions have been sassafras, *Sassafras varifolium;* white pine, *Pinus strobus;* balsam fir, *Abies balsamea;* spruce, *Picea sp.;* and hemlock, *Tsuga canadensis.* Sassafras is Hakluyt's wild guess; the northern limit of the tree is far south of Quebec. Of the others, spruce and hemlock are the more likely candidates. There is evidence that the inner bark of white spruce, *Picea canadensis,* which is known to be very rich in ascorbutic acid, was used in Indian medicine. It was an ingredient in a "spring tonic" compounded by white settlers in Ontario who had been told of its virtues by the Indians.[2] Hemlock, however, seems to have been in far greater use among the natives than any of the other conifers. It served them as food, drink and medicine. To give a few references: F. W. Waugh ("Iroquois Foods and Food Preparation," Ottawa, 1916), "Take the leaves, steep, sweeten with maple sugar, and eat with corn bread or at meals." John Stewart ("An Account of Prince Edward Island in the Gulph of St. Lawrence," London, 1806), ". . . and the tips yield a medicine which has been found very powerful in scorbutic complaints." L. H. Morgan ("Houses and Home Life of the American Aboriginies," Washington, 1881), "A favorite beverage was made from the tips of hemlock boughs boiled in water, and seasoned with maple sugar." And Thoreau relates that his Indian guide in the Maine woods gave him hemlock tea for breakfast. He added the characteristic remark, "and we were not obliged to go as far as China for it."

CHARLES MACNAMARA

ARNPRIOR, ONT., CAN.

SCIENTIFIC BOOKS

PSYCHOLOGY FOR THE FIGHTING MAN

Psychology for the Fighting Man. Prepared for the fighting man himself by a committee of the National Research Council with the collaboration of Science Service as a contribution to the war effort. Washington: *The Infantry Journal.* 1943.

IT is a truism that the popularization of science is not easy. Real scientific publications are never needlessly complex except when written by pedants or by scientists whose minds are not quite first-class. Of course the non-scientifically trained reader can not always follow good technical writing becase he is in respect to the science in question a layman and has not mastered its concepts. The duty of the true popularizer in science is to make the specific problems dealt with as clear as possible to the non-professional reader. It is an advantage also in popular writing to relate these problems in some way when possible to the ordinary experience of everyday life in which the non-technical reader is interested. The popularizer may then describe in simple and clear expository prose the solutions of the problems that have been raised. The intermediate description of special methods, particularly those that are mathematical, and the technical evaluation of the evidence of the science must in many cases be omitted or only most briefly presented.

The book before us is just such a true popularization. It is a most successful one. The common experience to which it is everywhere related is military life. How did this book come into being? The need for a presentation of real, modern, scientific psychology so that it could be understood by the average American enlisted man was early recognized. The way of achieving this end was discussed at a number of meetings of the Emergency Committee or "war cabinet" in psychology of the Division of Anthropology and Psychology of the National Research Council. Finally a committee was appointed to prepare the present book. The chairman of the committee and editor-in-chief of the volume was Professor E. G. Boring, of Harvard University.

Many psychologists contributed chapters or sections for the book. Much of this material as originally presented was not "popular" in the sense described in the

[1] SCIENCE, August 6, 1943.

[2] Personal letter from Professor R. B. Thompson, Department of Botany, University of Toronto.

first paragraph of this review. Therefore all the pages submitted were almost entirely rewritten by Professor Boring and Miss Marjorie van de Water of Science Service. Colonel E. L. Munson, Jr., a member of the committee, also read the complete manuscript, and Colonel Joseph I. Greene, editor of *The Infantry Journal,* made many suggestions concerning the military aspects of the book during the whole period of writing and rewriting. Amazingly enough, in spite of the complex relationship of scientists and committees associated with the book, Dr. Boring's untiring energy was able to drive the whole enterprise through in relatively few months so that already more than a hundred thousand copies of the volume have been put on sale in bookstores, drug-stores and post exchanges throughout the country and in other countries where our troops are located.

The table of contents of the book is as follows:

I: Psychology and Combat
II: Sight as a Weapon
III: Seeing in the Dark
IV: Color and Camouflage
V: Hearing as a Tool in Warfare
VI: Smell—A Sentry
VII: The Sense of Position and the Sense of Direction
VIII: The Right Soldier in the Right Job
IX: Training Makes the Soldier
X: How the Army Teaches
XI: Efficiency in the Army
XII: Heat, Cold, Oxygen and Stimulants
XIII: Morale
XIV: Food and Sex as Military Problems
XV: The Soldier's Personal Adjustment
XVI: Leadership
XVII: Mobs and Panic
XVIII: Differences Among Races and Peoples
XIX: Rumor
XX: Psychological Warfare

The chapter headings just enumerated give some impression of the wide areas of psychology treated in the volume.

The new book must be read by the professional scientist with the memory ever before him of the basic purpose of its pages. The statement that light "becomes visible when its strikes the retina of your eye" is useful in the frame of reference of this book, but obviously this is not a statement which would be appropriate in a treatise on physiological optics. Similar sentences could be taken from many pages of the book.

The chapters which deal with topics in social psychology may be less convincing to the popular as well as to the scientific reader than are the chapters that deal with areas in which quantitative psychology is better established.

A reviewer should not disclose himself as a book salesman, but in the case of the present volume and the present reviewer this rule is here and now violated. "Psychology for the Fighting Man" is a remarkable bargain. For twenty-five cents a modern, clearly written exposition of scientific psychology as it is applied to the task of warfare and incidentally to many tasks of the working world is now offered in a neat well-printed pocket edition. The reason that this book can be sold for such a small sum is that the authors, the editors and the publishers have all undertaken the preparation of this work as a war service. The small royalties on the book are transferred to the National Research Council for research. The Infantry Journal Company, publishers of the volume, is a non-profit organization.

Certainly every psychologist should read this volume from cover to cover. Scientists in other fields will also profit by reading its clear pages. Recently on an overnight train trip I lent my copy of this book to a distinguished engineer. In the morning he greeted me with the statement: "I am going to send copies of this book to my two sons who are in the service and tell them to read every page. It will be of great value to them." It is not too much to say that "Psychology for the Fighting Man" may actually save the life of some of its readers. It will almost certainly raise the morale of all who read it. The reason that it will have this direct result is that it will help every soldier who reads it to understand and use more effectively those most complicated "instrumentalities of warfare," his own human reactions.

Surely those whose self-sacrificing work has made this remarkable book possible deserve the full gratitude of all their American scientific colleagues.

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FUNDAMENTALS OF IMMUNOLOGY

Fundamentals of Immunology. By WILLIAM C. BOYD. xiv + 446 pp. 45 figs. Interscience Publishers, Inc. 1943. $5.50.

THE author writes this book with the sound belief that it is well for students to spend the too limited time available for the special subject immunology in acquiring the basic principles, "on the assumption that application of them will then not be difficult." "This book is intended for the beginner" without assuming any previous knowledge of the subject on his part, but it is hoped that it will be useful, too, to the professed immunologist. However, in the reviewer's opinion, this is not the book for elementary students but rather for advanced students and research workers.

The book is written as far as possible from the point of view of the chemist, without requiring any very

extensive knowledge of chemistry. The historical recapitulation of the development of discoveries and theories has been avoided. Instead, the author plunges straight into what is known and thought to-day. Selected references are given in support of statements and from them the reader can trace the question further if he so desires. All this is well done and the scheme is attractive.

It is a worth-while and important book, coordinating a multiplicity of complex evidence with a direct simplicity and it will undoubtedly be useful to the immunologist engaged in research and teaching. But it would be delightful could it be believed that the average medical student could read this book with understanding, especially Chapter VI on "Antibody-Antigen Reactions."

This book can not supplant such books as Bordet's "Traité de l'Immunité" and Topley's "Outline of Immunity" but it is a very important supplement to them. The subject-matter undertaken is too large to be uniformly covered by a book of this size and by the experience of a single author, so it is to be expected that readers with particular interests will find disappointments. The fields in which the author has contributed so importantly are most exhaustively and satisfactorily treated. Other sides of the subject are not always balanced and some are not sufficiently comprehensive.

For example, though active immunity claims more attention than passive immunity throughout the book, the influence and importance of the antigenic character of antibody globulin in therapeutic applications of passive immunity is neglected. In fact, immunity processes and happenings in the living body are not developed. On the whole the possibilities, contributions and failings of so-called antigenic analysis of the bacteria are not convincingly presented and this leaves a feeling of lack of sympathy. Of the 21 pages of Chapter IV ("Cell Antigens") rather less than half are devoted to bacteria, whereas almost the entire 22 pages of Chapter V ("Blood Groups") deal with human blood groups only.

The strength of the book lies in the treatment of "Antibodies and Antibody Specificity" (Chapter II, 56 pages), "Antigens" (Chapter III, 26 pages), "Antibody Antigen Reactions" (Chapter VI, 84 pages) and "Human Blood Groups" (Chapter V, 22 pages). These chapters should earn for the book a place in every bacteriological laboratory and every biological library. They can be consulted with advantage for the information they contain, but, much more importantly, for the clarity with which they pose problems yet to be solved to further advance this progressive and very important subject. This is no mean virtue.

An important feature of this book, the abandonment of a chronological account of discoveries, experiments, theories and failures, deserves to be emphasized because it allows of a clear statement of present knowledge. There is, of course, a fascinating interest to the well-informed specialist in the history of the development of his subject and it has the undoubted value of giving perspective. No one can properly appreciate the weight and significance of an item of information without knowing the difficulties, disappointments and the toil which accompanied its revelation and the prejudices which had to be overcome to effect its acceptance. Nevertheless, the dragging of a student through the warp and woof of a confused pattern of failures and misinterpretations hinders his acquisition and appreciation of the proved truth. Dr. Boyd has steered clear of this and in doing so has exposed problems it is now important to solve. A book is not as valuable for the information it imparts as it is for the thought and investigation it provokes.

E. G. D. MURRAY

INORGANIC QUALITATIVE ANALYSIS

Inorganic Qualitative Analysis. By HAROLD A. FALES and FREDERIC KENNY. Illustrated. ix + 237 pp. D. Appleton-Century Company, 1943. $2.65.

THIS book is designed for a one-semester course in which selected exercises in qualitative analysis serve to illustrate an introductory discussion of physico-chemical principles, as applied to aqueous solutions. The first one hundred and fifty pages, together with some ten pages of supplementary exercises, are devoted to the theoretical discussions, which appear to be clear and thorough, and include many numerical problems. Another sixty pages present procedures for the detection of basic constituents; while analysis for acidic constituents is omitted, save that tests for four of the commonest acids are given on the last three pages. The procedures, according to standard methods, are arranged for semi-micro technique and should confront the student with few difficulties and require a minimum of laboratory time. All analyses assumedly begin with solutions prepared for the student, and complications, such as might arise from the presence of certain anions or of involatile organic matter, are thus avoided. There is also no mention of the preliminary operations which would be necessary in the case of a substance originally solid.

The book is well arranged and indexed, and is provided with lists of the necessary apparatus and reagents. It seems well suited to serve as text for a smoothly running course having the strictly limited objective described in the first sentence above.

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SPECIAL ARTICLES

THE INFLUENCE OF METHYL CHALCONE OF HESPERIDIN ON THE TOXICITY OF MAPHARSEN IN RABBITS[1]

THE rapid treatment of early syphilis has attracted wide interest because of the benefit to the patient and the community from the completion of treatment in a matter of days. The toxicity of the methods used so far has been too high, however, to warrant their routine adoption.

The most serious toxic manifestation has been arsenical encephalopathy which, from published reports, has occurred in about 1.3 per cent. of patients given treatment with mapharsen.[2,3,4] The mortality has been about 0.3 per cent. The clinical findings range from headache and dizziness to convulsions and death. Elevation of the protein in the spinal fluid is regularly present. The pathological findings in man vary greatly. Hemorrhage may or may not be present, but by far the commonest finding is capillary damage. Goldstein and Stevenson[5] observed similar lesions in the brains of rabbits treated intensively with toxic doses of mapharsen. These findings suggest that the chief pathological alteration in arsenical encephalopathy is an increase in capillary permeability.

Beginning in 1940, we performed experiments in rabbits with numerous agents in an effort to prevent cerebral reactions from mapharsen, but none of these were successful. In 1936 Szent-Györgyi and his co-workers[6] suggested the existence of an anticapillary permeability factor which they called vitamin P, but the existence of this factor has not been definitely established. Goldfarb[7] employed an aqueous extract prepared from the whole lemon in the treatment of psoriasis, and suggested its use as a possible preventive of arsenical encephalopathy in patients receiving intensive treatment with mapharsen. As the result of this suggestion it was considered desirable to conduct preliminary experiments in rabbits with the lemon juice extract.

Lemon juice extract was fed to 18 New Zealand white male rabbits, each weighing approximately 2 kilograms, as follows: 10 cc of extract was administered by stomach tube once daily for two weeks prior to and during the administration of mapharsen. Mapharsen was injected intravenously twice daily for four days in doses of 8 milligrams per kilogram. Ten animals received mapharsen alone in an identical manner and served as controls. Survival rates in the two groups were: mapharsen and lemon juice, 28 per cent.; mapharsen alone, 10 per cent. This difference was not statistically significant.

Wawra and Webb[8] reported the isolation of a chalcone of hesperidin from lemon peel, which, in their preliminary experiments, appeared to decrease the fragility of capillaries and to prevent localized hemorrhages. Later a methyl chalcone was developed by the Research Department of the California Fruit Growers Exchange in order to prevent reversion of the chalcone to the closed ring of hesperidin. This product was made available to us, and three experiments were performed in which a total of 30 rabbits received methyl chalcone and mapharsen, while 30 received mapharsen alone. Methyl chalcone was injected intravenously in doses of 10 or 30 milligrams per kilogram once daily for 7 days prior to the administration of mapharsen and for the 4 days of mapharsen administration. Mapharsen was injected intravenously twice daily for 4 days in doses of 8 milligrams per kilogram. The results are shown in Table I. Survival rates, determined after three weeks of observation following the last treatment, were as follows: mapharsen and methyl chalcone, 90 per cent., mapharsen alone, 57 per cent. The difference in survival rate between the two groups is statistically significant, the relative deviate being 2.9.

TABLE I

Exper. No.	Methyl chalcone mg/kg per dose	Mapharsen + methyl chalcone: Number of animals Total	Died	Survived	Per cent. survival	Mepharsen alone: Number of animals Total	Died	Survived	Per cent. survival
1	10	5	1	4	80	5	3	2	40
2	30	15	1	14	93	10	4	6	60
3	30	10	1	9	90	15	6	9	60
Total		30	3	27	90	30	13	17	57

The influence of methyl chalcone of hesperidin upon the spirocheticidal effect of mapharsen was studied *in vitro*. Exudate containing abundant *Treponema pallidum* was obtained from patients with mucous membrane lesions of secondary syphilis. Dark field preparations were made by mixing equal volumes of the exudate and the solution to be tested by means

[1] Supported in part by funds from the following agencies: The New York State Health Department, the Louis Livingston Seaman Fund, the California Fruit Growers Exchange Research Fund of New York University College of Medicine.

[2] L. Chargin, *Arch. Dermat. and Syph.*, 42: 248, 1940.

[3] E. W. Thomas and Gertrude Wexler, *Am. Jour. Pub. Health*, 31: 545, 1941.

[4] E. W. Thomas, Gertrude Wexler and B. Dattner, *Am. Jour. Syph., Gon. and Ven. Dis.*, 26: 529, 1942.

[5] D. H. Goldstein and L. D. Stevenson. To be published.

[6] A. Bentsath, S. Rusznyak and A. Szent-Györgyi, *Nature*, 138: 798, 1936. L. Armentano, A. Bentsath, T. Beres, S. Rusznyak and A. Szent-Györgyi, *Deutsche med. Wchnschr.*, 62: 1325, 1936.

[7] A. E. Goldfarb, *Arch. Dermat. and Syph.*, 43: 536, 1941.

[8] C. Z. Warwa and J. L. Webb, SCIENCE, 96: 302, 1942.

of calibrated red blood cell pipettes. The following preparations were set-up:

(1) Saline + spirochete fluid.
(2) Chalcone 1: 1,333 + spirochete fluid.
(3) Chalcone 1: 1,333 + mapharsen 1: 4,000 + spirochete fluid.
(4) Mapharsen 1: 4000 + spirochete fluid.
(5) Mapharsen 1: 4000 + glutathione 1: 400 + spirochete fluid.
(6) Glutathione 1: 400 + chalcone 1: 1,333 + spirochete fluid.
(7) Glutathione 1: 400 + spirochete fluid.

All dilutions are final dilutions. All reagents were adjusted to pH 7 ±.

The results of six experiments are shown in the

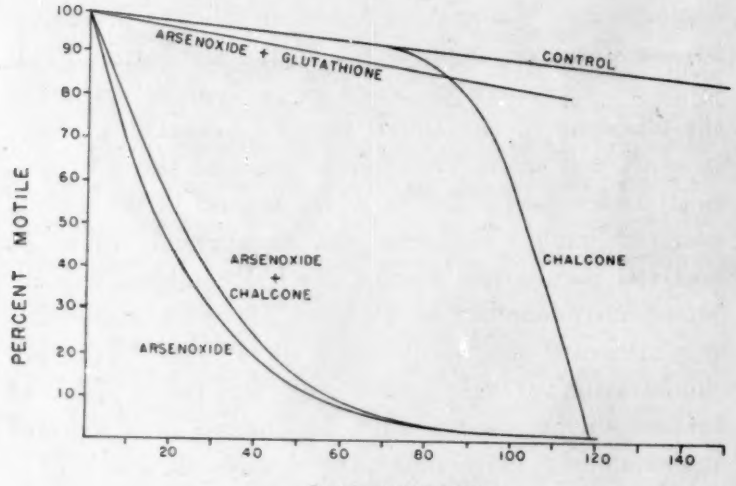

FIG. 1. Effect of various agents and their combinations on the motility of *Treponema pallidum in vitro*.

graph. The curves represent the average percentage of spirochetes retaining motility at the stated intervals. In the concentrations used, methyl chalcone did not inhibit the spirocheticidal action of mapharsen *in vitro*. Methyl chalcone appeared to exert independent spirocheticidal activity between 90 and 120 minutes after mixture with spirochetes. This effect could be abolished by glutathione.

These preliminary observations indicate that the methyl chalcone of hesperidin may be capable of diminishing the toxic effects of mapharsen without inhibiting its spirocheticidal effect, and that it may possess independent spirocheticidal activity to a mild degree. Further studies are in progress to explore these possibilities.

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THE ANTIBACTERIAL EFFECT OF ENZYMATIC XANTHINE OXIDATION[1]

RAISTRICK and his colleagues[2] made the curious observation that an oxidase may display antibacterial activity. They had observed a bactericidal activity with certain protein fractions from *Penicillium notatum* which definitely was not attributable to the ether-soluble, low-molecular penicillin. Eventually this bactericidal effect was traced to glucose oxidase, a flavoprotein which catalyzes the reaction:

$$\text{glucose} + O_2 \longrightarrow \text{gluconic acid} + H_2O_2$$

The generated hydrogen peroxide was thought to be mainly, if not exclusively, responsible for the bactericidal effect of the enzymatic system.[3] The name, notatin, was suggested for this enzymatic bactericide. Simultaneously two similar reports appeared: bactericidal protein-fractions derived from *Penicillium notatum* were described by Kocholaty[4] under the name of penatin and by Doisy *et al.*[5] under the name penicillin B.

Glucose oxidase, although not in its present role, has been known for some time. It is an enzyme found commonly in molds[6] and most abundantly in *Aspergillus niger*. It was recognized as a flavin enzyme.[7] Judging from the latest communications by Doisy *et al.*,[8] Kocholaty,[9] and by Birkinshaw and Raistrick,[3] there seems to be no reasonable doubt that the common mold glucose oxidase is the active principle in penatin and penicillin B as well as in notatin.

The conclusion reached by Raistrick *et al.* that their antibacterial activity was due essentially to the generation of hydrogen peroxide invited the rather obvious deduction that other oxidases may be found which act similarly. To prove this, it was decided to carry out appropriate experiments with xanthine oxidase. This H_2O_2 generating[10] enzyme was chosen because it may be easily obtained relatively free from counteracting factors, such as catalase, peroxidase, etc. Furthermore, the natural occurrence of this enzyme in milk suggested that with its appropriate substrate it may

[1] Aided by a grant from the Commonwealth Fund.

[2] C. E. Coulthard, W. F. Short, R. Michaelis, G. Sykes, G. E. H. Skrimshire, A. F. B. Standfast, J. H. Birkinshaw and H. Raistrick, *Nature*, 150: 634, 1942.

[3] J. H. Birkinshaw and H. Raistrick, *Jour. Biol. Chem.*, 148: 459, 1943.

[4] W. Kocholaty, *Jour. Bact.*, 44: 142, 469, 1942.

[5] E. C. Roberts, C. K. Cain, R. D. Muir, F. J. Reithel, W. L. Gaby, J. H. Van Bruggen, D. M. Homan, P. A. Katzman, L. R. Jones and E. A. Doisy, *Jour. Biol. Chem.*, 147: 47, 1943.

[6] D. Muller, *Biochem. Zeits.*, 199: 136, 1928.

[7] W. Franke and M. Deffner, *Ann. Chem.*, 541: 117, 1939.

[8] J. T. Van Bruggen, F. J. Reithel, C. K. Cain, P. A. Katzman, E. A. Doisy, R. D. Muir, E. C. Roberts, W. L. Gaby, D. M. Homan and L. R. Jones, *Jour. Biol. Chem.*, 148: 365, 1943.

[9] W. Kocholaty, *Arch. Biochem.*, 2: 73, 1943.

[10] M. Dixon and S. Thurlow, *Biochem. Jour.*, 18: 971, 1924.

be employed as a milk preservative. It was, however, already known that in whole milk the hydrogen peroxide formed through xanthine or hypoxanthine oxidation would disappear almost as rapidly as it was formed.[11] Nevertheless, addition of hypoxanthine depresses, to some extent, bacterial growth in milk.

Enzyme preparation. It was desirable to use a preparation pure enough to allow hydrogen peroxide to accumulate sufficiently. Too highly purified preparations seemed undesirable because they tend to become unstable. A suitable degree of purity was obtained when we followed the isolation procedure of Corran *et al.*[12] up to their third step. Activity was measured manometrically in the manner described by Ball.[13] The enzyme solution we used for the preparation of our test solution was golden yellow in color; it contained 21 mg protein per ml and its Q_{O_2} was 120 (28° C.). To estimate roughly the amount of pure enzyme therein, the light absorption at 450 mμ, the maximum for riboflavin, was measured with the Beckman Spectrophotometer. About one third of the apparent flavin absorption may be attributed to enzyme-flavin (*cf.* [12]). We found 8.3 γ flavin per ml attributable to xanthine oxidase. Using Ball's figure of 74,000[13] for the molecular weight per mole of flavin, it appears that in our preparation 1.7 out of 21 mg of protein per ml, or 8 per cent. was xanthine oxidase. The enzyme concentrations given in the following experiments refer to content of pure enzyme as estimated in the above manner.

Tests with this preparation showed a satisfactory stability of the enzyme and of enzymatically formed hydrogen peroxide. When three ml of a thirty times diluted solution of this enzyme preparation acted upon 5 micromols of hypoxanthine, the substrate was oxidized to completion in one hour, at which time 70 to 75 per cent. of the theoretically expected hydrogen peroxide was found in the solution.

TABLE 1

GROWTH OF STAPHYLOCOCCUS AUREUS IN BROTH CULTURE

Xanthine oxidase concentration	Additions	
	0	33 mg per cent. hypoxanthine
0	+	+
1:12,500	–	–
1:115,000	–	–
1:1,000,000	–	–
1:3,000,000	+	+

Inhibition of bacterial growth by xanthine oxidase. Small inocula of young cultures of a typical Staphylococcus aureus were used for the tests. Readings were taken after 18 hours incubation at 37° C. A sterilization of our enzyme was found unnecessary, the absence of bacteria being due probably to the effects of repeated freezing and thawing. This was fortunate because preliminary experiments showed an almost complete inactivation after filtering through a Seitz filter. The first experiments were done with broth as a culture medium. As shown in Table 1 no growth occurred with the enzyme concentrations down to $1:10^6$. Growth inhibition was, however, independent of addition to the broth of hypoxanthine, because the meat broth already contained, as we found afterwards, appreciable amounts of a substance oxidizable with xanthine oxidase. From the agreement between oxygen consumption and uric acid formation this was considered to be mainly or exclusively hypoxanthine.

In a second series (Table 2) a peptone medium was used, which showed no chemical reaction with the enzyme. With this medium xanthine oxidase alone

TABLE 2

GROWTH OF STAPHYLOCOCCUS AUREUS IN PEPTONE CULTURE

Xanthine oxidase concentration	Additions		
	0	hypoxanthine	
	growth	*growth*	H_2O_2
0	+	+	–
1:94,000	+	–	++
1:850,000	+	–	+
1:2,500,000	+	+	–

was without inhibitory effect. Here inhibition was first brought about by incubation with enzyme together with its substrate, hypoxanthine. Tests for hydrogen peroxide with luminol[14] showed its presence in the inhibited samples and its absence in those where growth had occurred.

In the present case the enzyme concentration needed to effect inhibition is about one thousand times higher than that reported for glucose oxidase. We believe this to be due to a greater stability of the mold enzyme.

Experiments with milk. Relatively crude experiments were carried out. The effect of an addition of hypoxanthine to raw milk was evaluated after incubation at room temperature or in the refrigerator. Incubation at 37° resulted in too heavy growth even in the presence of hypoxanthine. Raw milk was infected lightly with *Staphylococcus aureus* and kept for one day at 23–25° C. The count for Staphylococcus was then 500,000 per ml with hypoxanthine against 2,500,000 without. Other organisms were similarly inhibited with the exception mainly of certain streptococci. In another experiment, without addition of extraneous bacteria, after one day in the refrigerator a count of 68,000 per ml was obtained with hypoxanthine against 133,000 without.

In a sense these experiments only confirm the fore-

[11] O. Schales, *Ber.*, 71: 447, 1938.
[12] H. S. Corran, J. G. Dewan, A. H. Gordon and D. E. Green, *Biochem. Jour.*, 33: 1694, 1939.
[13] E. G. Ball, *Jour. Biol. Chem.*, 128: 51, 1939.
[14] O. Schales, *Ber.*, 72: 167, 1939.

gone conclusion that hydrogen peroxide is inhibitory to certain bacteria, mostly anaerobic and facultative anaerobic types devoid of catalase.[15] Many of the pathogenic cocci are of this type. There may, in certain surgical cases, be merits to the slow but steady generation of hydrogen peroxide as brought about by an enzyme system. The difficulties of preparation, however, would outweigh any, probably rather limited usefulness.

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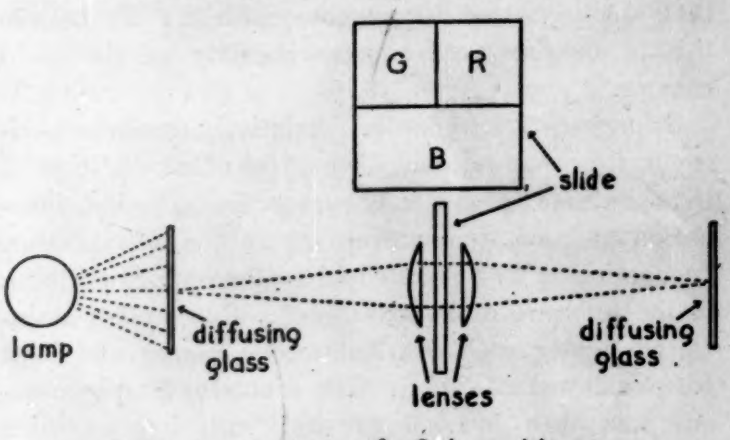
SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE THREE-COLOR MIXER USING FILTERED COLORS

THE method of color mixing most commonly used in psychological laboratories is the rotating disc or color wheel. Though this method is excellent for many purposes, it has certain disadvantages inherent to the use of surface pigments: (1) mixtures are relatively low in saturation (particularly in the case of yellow produced by a mixture of red and green); (2) complementary mixtures are gray rather than white; (3) brightness can not be controlled independently of room illumination without sacrifice of saturation. These disadvantages can be avoided with mixtures produced with filtered colors.

A device which the author recently built uses an extremely simple principle to provide mixtures of three filtered colors. The general design would seem to be of potential value for such uses as (1) measurement of hue (and saturation) discrimination thresholds in both human beings and animals, (2) detection and analysis of color blindness, (3) specification of pigments in terms of three-color components by matching with three color mixtures, (4) classroom demonstrations of color mixing.

The optical system for accomplishing the trichromatic mixture is shown in Fig. 1. Gelatin color filters



Optical System of Color Mixer

FIG. 1

are mounted between glass, forming a square slide. One upper quadrant of the slide is red, the other quadrant is green, and the bottom half is blue. The filters used in the author's apparatus are Wratten gelatin filters of numbers 29 (red), 47 (green) and 61 (blue).

This color mixing slide is supported on a two-way sliding mount between two lenses. Light from one diffusing screen is focused by the lenses upon another diffusing screen. Both screens are of flashed opal glass. Between the two lenses the light rays are parallel, and whatever colors intercept the light beam at this point become uniformly mixed on the second diffusing screen.

Two adjustments of the color-mixing slide are provided by means of levers moving along graduated scales. One lever moves the slide horizontally, thus changing the red-green proportion in the mixture. The other lever moves the slide vertically, thus adjusting the blue component. More specifically, by the two directions of movement, the slide can be adjusted to transmit any one of the three colors singly, or combinations of the three colors in any proportions. On the stimulus screen one can, therefore, obtain any color around or within the color circle. Due to the lack of homogeneity of the filtered colors, however, the resulting mixtures do not quite equal spectral mixtures in saturation. On the other hand, the mixtures far exceed in saturation those obtained on the color wheel.

That the color-mixing principle described here is successful was adequately demonstrated by a single unit built by the author while at the University of Missouri. Color mixtures of good saturation, moderately high brightness and uniform distribution were obtained.

The apparatus is particularly recommended for the demonstration of color-mixing principles. If intended for this purpose, the apparatus should be built so that the stimulus screen can be removed easily and the separate colors being mixed thus exposed to view.

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BOOKS RECEIVED

BLACKWOOD, OSWALD. *General Physics.* Illustrated. Pp. viii + 622. John Wiley and Sons. $3.75.

SOPER, FRED L. and D. BRUCE WILSON. *Anopheles Gambiae in Brazil.* Illustrated. Pp. xviii + 262. The Rockefeller Foundation.

[15] J. W. MacLeod and J. Gordon, *Jour. Path. Bact.*, 25: 139, 1922.